as amended

24 (New) A method according to claim 21, wherein the causing step is performed by a digital signal processor.

REMARKS

Entry of the above amendments is respectfully requested. Claims 1, 3, 5-6, and 13-14 have been amended. Claims 15-24 have been added to the application. Claims 1-24 are pending in the application. Favorable reconsideration and allowance of the application is respectfully requested in light of the foregoing amendments and the remarks which follow.

1. Claim Rejections - 35 U.S.C. § 112

The Examiner rejected claim 5 under 35 U.S.C. § 112 as being unclear. Applicant is unsure as to what the Examiner considers to be unclear in original claim 5. Nevertheless, in order to respond to the rejection, Applicant has implemented several minor amendments to claim 5 each of which is intended to enhance the clarity of claim 5. No change in scope is intended. Applicant also notes that claim 1 has been amended to change "the determining steps (A)-(D)" to simply "steps (A)-(D)". This change was implemented to enhance readability since step (C) recites "comparing" instead of "determining." No change in scope is intended. Also, claims 13 and 14 have been amended to make clear that it does not necessarily need to be the comparator that issues the event notification; the event notification may also be issued by another part of the digital signal processor. Other clarifying amendments have also been made throughout the claims to enhance their readability.

Accordingly, withdrawal of the rejection under 35 U.S.C. § 112 and allowance of claim 5 is respectfully requested.

2. Claim Rejections - 35 U.S.C. §§ 102 and 103

The Examiner rejected claims 1-2 and 4-12 under 35 U.S.C. § 102(e) as being anticipated by Wolfe et al. ("Wolfe"; U.S. Pat. No. 6,037,930). The Examiner rejected claims 13-14 under 35 U.S.C. § 103(a) as being unpatentable over Wolfe in view of Chambers et al. ("Chambers"; U.S. Pat. No. 6,445,383).

A. Allowability of Independent Claim1

Claim 1 recites "determining whether [a] difference [between a location of a first touch and a location of a second touch] exceeds a predetermined amount." Further claim 1 recites "wherein . . . discrete logic circuitry provides an event notification to a microprocessor when the . . . difference [between the locations of the first and second touches] exceeds the predetermined amount." Wolfe does not teach or suggest claim 1 because Wolfe does not teach or suggest these features.

The Background of the Invention section of the present application includes the following background information:

> Current techniques for obtaining a satisfactory level of responsiveness require a significant amount of processor overhead, however, because the microprocessor scans the touch screen directly or because the microprocessor must monitor a continuous stream of data from a separate scanning module or hardware. For example, dragging a cursor around the screen in random directions on a Microsoft® Windows™ NT system that supports hardware cursoring can register an additional 3% to 7% of the processing power of a 300 MHz Pentium II™ system under the task monitor program. By comparison, major architectural or processor step changes usually provide only a 5% to 10% processing speed improvement.

In the present invention as defined by claim 1, a discrete logic circuit first determines whether the difference in location between first and second touches is greater than a predetermined amount. When the difference exceeds the predetermined amount, the discrete logic circuit issues an event notification to a microprocessor. (See also, description of preferred embodiment, page 32, lines 20-24 ("As has been described, rather than sending a continuous information stream to the microprocessor when the touch screen is in use, the logic circuit 250 interrupts the microprocessor only when

touch screen movement is sufficiently significant in order to minimize intervention of the microprocessor in the scanning process."))

In Wolfe, the controller 8 continuously generates ΔX and ΔY information (i.e., ΔX and ΔY referring to the change in position in the X and Y dimension, respectively, of the operator's touch since the most recent update). (Col. 5, lines 22-26; col. 8, lines 60-62.) The detector 4 provides a logic signal to the controller 8 which indicates whether the pad is being touched at a particular moment. (Col. 6, lines 21-23.) In turn, the controller 8 provides the computer 10 with information when the pad is being touched. As shown in at step 8 of Fig. 11A, the question is asked "IS PAD BEING TOUCHED NOW?" If the answer to this question is yes, the process will proceed to step 11, labeled "SEND HOST MOVEMENT VECTOR, SWITCH POSITIONS, TOUCH STATES." If the answer to step 8 is no, then step 11 is skipped. **Thus, as shown in Figs. 11A-11B of Wolfe, the test used by the controller 8 to determine whether it should provide position information the computer 10 is simply whether the touch pad is being touched. Movement of the operator's finger (and the values of ΔX and ΔY) is irrelevant.** Even if the operator's finger remains stationary ($\Delta X = 0$; $\Delta Y = 0$), the microprocessor is still notified at step 11.

Thus, Wolfe does not teach or suggest "determining whether [a] difference [between a location of a first touch and a location of a second touch] exceeds a predetermined amount." The Examiner's position appears to be that the controller 8 performs this step because it determines the values ΔX and ΔY. The Examiner states that Wolfe teaches determining whether a "difference exceeds a predetermined (by delta X and delta Y)." However, in Wolfe's calculations, there is no "predetermined value" with which the ΔX and ΔY position information is compared.

Further, Wolfe does not teach or suggest "wherein . . . discrete logic circuitry provides an event notification to a microprocessor when the . . . difference [between the locations of the first and second touches] exceeds the predetermined amount." In Wolfe, it appears an interrupt is issued to the computer 10 continuously whenever data from the touch pad is available. (See Fig. 11A step 8.) **The controller 8 in Wolfe does not determine whether the difference between two locations exceeds a predetermined amount and then issue an event notification in response to such a determination. Instead, Wolfe teaches that the controller 8 determines whether the pad is being**

touched (see Step 8), and provides data to the computer 10 whenever the pad is being touched (see Step 11).

B. Allowability of Independent Claim 5

Claim 5 has been rewritten in independent form. Claim 5 recites "wherein the predetermined amount defines a perimeter of a region that surrounds the first location, and wherein the determining step (D) comprises determining whether the second location is outside the perimeter." Wolfe does not teach or suggest claim 5 because Wolfe does not teach or suggest these features.

In Wolfe, it is determined that the pad is being touched at step 8, then Wolfe sends information at step 11 of Fig. 11B. No further examination of the location of the operator's touch or whether the change in position exceeds a predetermined amount is performed in deciding whether to issue an event notification to the computer 10. The concept of a perimeter that surrounds a first location, and determining whether the second location is outside the perimeter, is not taught or suggested by Wolfe.

C. Allowability of Independent Claim 7

Claim 7 recites "determining whether the indication of the amount of mouse pointer movement exceeds a predetermined amount" and "wherein the discrete logic circuitry provides an event notification to a microprocessor when the indication of the amount of movement exceeds the predetermined amount." Wolfe does not teach or suggest claim 7 because Wolfe does not teach or suggest these features.

Wolfe does not teach examining movement of the operator's touch to determine whether it exceeds a predetermined amount. Rather, if it is determined that the pad is being touched at step 8, then the controller 8 sends information at step 11 of Fig. 11B. No further examination of the location of the operator's touch or whether the amount of movement exceeds a predetermined amount is performed in deciding whether to issue an event notification to the computer 10.

D. Allowability of Independent Claims 13 and 14

Claims 13 and 14 both recite "a comparator [that compares] a new location of a touch to a previous location of a touch and issuing an event notification to the microprocessor if an indication of the difference between the previous location and the

new location exceeds a predetermined amount." Wolfe does not teach or suggest claims 13 and 14 because Wolfe does not teach or suggest these features.

In Wolfe, if it is determined that the pad is being touched at step 8, then Wolfe sends information at step 11 of Fig. 11B. No further comparison of the new and previous locations is performed in deciding whether to issue an event notification to the computer 10.

Accordingly, allowance of independent claims 1, 5, 7, 13, and 14 is respectfully requested.

3. New Independent Claims 20-22

New independent claim 20 recites "determining that the second location is outside a perimeter of a region, the first location being inside the perimeter of the region" and "issuing an event notification to the microprocessor in response to determining that the second location is outside the perimeter of the region." Wolfe does not teach or suggest these features. In Wolfe, the computer 10 is provided with data from the operator input device based only on whether the operator input device is being touched (see Fig. 11A, step 8).

New independent claim 21 recites "causing a microprocessor to wait to process data from the operator input device until after . . . additional data is acquired, such that the microprocessor does not process the additional data;" "after acquiring the additional data, acquiring further additional data from the input device relating to a second desired position of the mouse pointer on the display, the second desired position having a second location that is outside a perimeter of a region, the first location of the first operator touch being inside the perimeter;" and "wherein the causing step (D) reduces operator overhead required to process data from the operator input device as compared to the microprocessor overhead that would be required if the microprocessor processed the additional data." Wolfe does not teach or suggest these features. In Wolfe, it appears the controller 8 provides the computer 10 with a continuous stream of data when the pad is pressed (see Fig. 11A, step 8).

New independent claim 22 recites "causing a microprocessor to wait to process data from the touch plane operator input device until after the additional data is

acquired, such that the microprocessor does not process the additional data;" "after acquiring the additional data, acquiring further additional data from the touch plane operator input device relating to a second touch on the touch screen, the second operator touch having a second location that is outside a perimeter of a region, the first location of the first operator touch being inside the perimeter;" and "wherein the causing step (D) reduces operator overhead required to process data from the touch plane operator input device as compared to the microprocessor overhead that would be required if the microprocessor processed the additional data." Wolfe does not teach or suggest these features. In Wolfe, it appears the controller 8 provides the computer 10 with a continuous stream of data when the pad is pressed (see Fig. 11A, step 8).

Accordingly, allowance of new independent claims 20-22 is respectfully requested.

4. Dependent Claims

The remaining claims are dependent claims and are allowable for the reasons their respective base claims are allowable, and for reciting other novel and non-obvious features.

5. Allowable Subject Matter

Applicant notes with appreciation the Examiner's indication that claim 3 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant has rewritten claim 3 in independent form to include the substance of base claims 1 and 2. Accordingly, allowance of claim 3 is respectfully requested.

6. Conclusion

In view of the foregoing amendments and remarks, favorable reconsideration and allowance of the application is respectfully requested. Should the Examiner have any remaining questions, the Examiner is invited to contact the undersigned at the telephone number appearing below.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.116-1.17, or credit any overpayment, to Deposit Account No. 06-1447.

Respectfully submitted,

Date 2/27/03

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

- ***Marked up rewritten claims:***

1 (Amended) A method of processing an input from a touch plane operator input device, comprising:

(A) determining a first location of a first touch on the touch plane operator input device;

(B) determining a second location of a second touch on the touch plane operator input device;

(C) comparing the first and second locations to obtain an indication of an amount of difference between the first and second locations; and

(D) determining whether the indication of the amount of difference exceeds a predetermined amount;

wherein [the determining] steps (A)-(D) are performed by discrete logic circuitry; and

wherein the discrete logic circuitry provides an event notification to a microprocessor when the indication of the amount of difference exceeds the predetermined amount.

3. (Amended) [A method according to claim 2,]

A method of processing an input from a touch plane operator input device, comprising:

(A) determining a first location of a first touch on the touch plane operator input device, including determining an X-location and a Y-location of the first touch, including [wherein the step of determining the X-location and the Y-location of the first touch comprises]

(1) acquiring a first plurality of data samples from the touch plane operator input device,

(2) calculating the X-location of the first touch by determining an average X-location for the first plurality of data samples, and

(3) calculating the Y-location of the first touch by determining an average Y-location for the first plurality of data samples; [and]

(B) determining a second location of a second touch on the touch plane operator input device, including determining an X-location and a Y-location of the second touch, including [wherein the step of determining the X-location and the Y-location of the second touch comprises]

(1) acquiring a second plurality of data samples from the touch plane operator input device,

(2) calculating the X-location of the second touch by determining an average X-location for the second plurality of data samples, and

(3) calculating the Y-location of the second touch by determining an average Y-location for the second plurality of data samples;

(C) comparing the first and second locations to obtain an indication of an amount of difference between the first and second locations, including

(1) determining a first amount of difference between the X-location of the first touch and the X-location of the second touch, and

(2) determining a second amount of difference between the Y-location of the first touch and the Y-location of the second touch; and

(D) determining whether the indication of the amount of difference exceeds a predetermined amount, the predetermined amount comprising a first predetermined amount in an X-direction and a second predetermined amount in a Y-direction, including comparing the first amount of difference with the first predetermined amount and comparing the second amount of difference with the second predetermined amount;

wherein steps (A)-(D) are performed by discrete logic circuitry; and

wherein the discrete logic circuitry provides an event notification to a microprocessor when the indication of the amount of difference exceeds the predetermined amount.

5. (Amended) [A method according to claim 1,] A method of processing an input from a touch plane operator input device, comprising:

(A) determining a first location of a first touch on the touch plane operator input device;

(B) determining a second location of a second touch on the touch plane operator input device;

(C) comparing the first and second locations to obtain an indication of an amount of difference between the first and second locations; and

D) determining whether the indication of the amount of difference exceeds a predetermined amount;

wherein steps (A)-(D) are performed by discrete logic circuitry; and

wherein the discrete logic circuitry provides an event notification to a microprocessor when the indication of the amount of difference exceeds the predetermined amount,

wherein the predetermined amount defines [is defined by] a perimeter of a region that surrounds the first location, and wherein the determining step (D) comprises determining whether the second location is outside the perimeter.

6. (Amended) A method according claim 1, wherein [the determining] steps (A)-(D) are performed under the control of a state machine implemented in the discrete logic circuitry.

13. (Amended) An integrated circuit comprising:

(A) a microprocessor;

(B) a touch screen interface, the touch screen interface being adapted to interface the microprocessor to a touch screen; and

(C) a digital signal processor, the digital signal processor being coupled between the touch screen interface and the microprocessor, the digital signal processor being adapted to determine a location of a touch on the touch screen, the digital signal processor including a comparator, the comparator comparing a new location of a touch to a previous location of a touch, and the digital signal processor issuing an event notification to the microprocessor if an indication of the difference between the previous location and the new location exceeds a predetermined amount.

14. (Amended) A device comprising:

(A) a touch screen, the touch screen including a touch screen display and a touch screen sensor system; and

(B) an integrated circuit, the integrated circuit including

(1) a microprocessor;

(2) a touch screen interface, the touch screen interface being adapted to interface the microprocessor to the [a] touch screen; and

(3) a digital signal processor, the digital signal processor being coupled between the touch screen interface and the microprocessor, the digital signal processor being adapted to determine a location of a touch on the touch screen, the digital signal processor including a comparator, the comparator comparing a new location of a touch to a previous location of a touch, and the digital signal processor issuing an event notification to the microprocessor if an indication of the difference between the previous location and the new location exceeds a predetermined amount.